

HORTICULTURE SCIENCE AND TECHNOLOGY (CIP: 01.0601)

Occupational Skills

The Student demonstrates the specified level of competency in occupational skills:

0	1	2	3	4
No Exposure	Introduced	Practiced	Entry-level	Competency

SECTION I

HORTICULTURE SCIENCE AND TECHNOLOGY FUNDAMENTALS

0 1 2 3 4

00000

- A. Horticulture Careers**
(Vermont Standards: 3.15, 3.16, 4.5)

00000

- B. Plant Science Processes**
(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11, 7.13)

00000

- C. Plant Science Taxonomy**
(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11, 7.13)

00000

- D. Soil Science Concepts**
(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11, 7.13)

00000

- E. Plant Propagation: Sexual**
(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11, 7.13)

00000

- F. Plant Propagation: Asexual**
(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11, 7.13)

00000

- G. Pest Control**
(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11, 7.13)

BUSINESS MANAGEMENT AND RECORD KEEPING

00000

- A. Horticulture Enterprises**
(Vermont Standards: 1.3, 1.8, 1.18, 1.22, 3.7, 7.6, 7.10, 7.18)

00000

- B. Finance and Record Management**
(Vermont Standards: 1.8, 2.5, 7.6, 7.10)

00000

- C. Sources of Horticultural Information and Assistance**
(Vermont Standards: 1.18, 1.19)

SALES, MERCHANDISING, AND MARKETING

00000

- A. Sales Tasks**

(Vermont Standards: 1.11, 1.13, 1.15, 1.19, 1.22, 2.1, 3.3, 3.8, 3.11)

00000 B. **Product and Service Advertising and Marketing**
(Vermont Standards: 1.19, 2.3, 2.6, 5.15)

00000 C. **Customer Services**
(Vermont Standards: 1.13, 2.11, 3.3, 3.10, 3.12, 3.13)

HORTICULTURE MECHANICS

00000 A. **Horticulture Equipment Operation**
(Vermont Standards: 1.3, 2.1, 2.2, 3.14, 7.7, 7.10, 7.11, 7.12)

00000 B. **Safety Practices**
(Vermont Standards: 1.3, 1.15, 2.3, 3.5, 3.7)

SECTION II

GREENHOUSE OPERATION

00000 A. **Plant Identification**
(Vermont Standards: 1.19, 7.1)

00000 B. **Greenhouse Plant Propagation**
(Vermont Standards: 3.8, 7.6, 7.10, 7.13)

00000 C. **Growing Mediums and Seed Beds**
(Vermont Standards: 2.2, 3.14, 7.6, 7.8)

00000 D. **Plant Environment Control**
(Vermont Standards: 1.18, 2.1, 2.3, 3.14, 7.10, 7.11, 7.12, 7.19)

00000 E. **Pest Control**
(Vermont Standards: 1.18, 2.1, 2.3, 7.13, 7.19)

NURSERY OPERATION

00000 A. **Nursery Plant Identification**
(Vermont Standards: 1.19, 7.1)

00000 B. **Nursery Plant Propagation**
(Vermont Standards: 3.8, 7.6, 7.10, 7.13)

00000 C. **Growing Mediums and Seed Beds**
(Vermont Standards: 2.2, 3.14, 7.6, 7.8)

00000 D. **Plant Environment Control**
(Vermont Standards: 1.18, 2.1, 2.3, 3.14, 7.10, 7.11, 7.12, 7.19)

00000 E. **Pest Control**
(Vermont Standards: 1.18, 2.1, 2.3, 7.13, 7.19)

RETAIL FLORIST

- 00000 A. **Floral Design**
(Vermont Standards: 1.3, 1.16, 1.18, 2.2, 2.13, 3.8, 3.14, 5.15, 7.6, 7.10)
- 00000 B. **Plant Environment Control**
(Vermont Standards: 1.3, 3.13, 7.10, 7.13)
- 00000 C. **Pest Control**
(Vermont Standards: 1.18, 2.1, 2.3, 7.13, 7.19)

LANDSCAPE/TURF SERVICES

- 00000 A. **Landscape Plant Identification**
(Vermont Standards: 1.18, 1.19, 2.2, 7.13)
- 00000 B. **Landscape Area Preparation**
(Vermont Standards: 1.18, 1.22, 2.1, 2.2, 3.8, 5.15, 7.6, 7.7, 7.10)
- 00000 C. **Trees, Shrubs, Ground Cover, and Flowers Planting**
(Vermont Standards: 1.19, 2.1, 7.6, 7.7, 7.10, 7.13)
- 00000 D. **Turf and Lawn Establishment and Renovation**
(Vermont Standards: 1.16, 1.19, 2.2, 3.8, 5.15, 7.7, 7.10, 7.11)
- 00000 E. **Tree, Shrub, Ground Cover, and Flower Maintenance**
(Vermont Standards: 1.18, 2.1, 2.2, 3.14, 7.13)
- 00000 F. **Landscape Design**
(Vermont Standards: 1.16, 1.19, 2.1, 2.2, 3.8, 5.15, 7.6, 7.7, 7.19)
- 00000 G. **Pest Control**
(Vermont Standards: 1.18, 1.19, 2.1, 2.2, 3.14, 7.6, 7.13)

ARBORIST SERVICES

- 00000 A. **Tree Care and Maintenance**
(Vermont Standards: 1.3, 1.8, 2.2, 3.13, 3.14, 7.8, 7.10, 7.12, 7.13, 7.16)
- 00000 B. **Pest Control**
(Vermont Standards: 1.3, 1.91, 2.1, 3.7, 7.10, 7.13)

FRUIT AND VEGETABLE PRODUCTION

- 00000 A. **Soil Management**
(Vermont Standards: 1.3, 1.18, 2.1, 3.9, 7.6, 7.11, 7.13)
- 00000 B. **Soil Preparation for Planting**
(Vermont Standards: 1.3, 3.7, 7.1, 7.6, 7.13)
- 00000 C. **Crop Planting/Transplanting**

00000

D. Crop Fertilization
(Vermont Standards: 1.3, 2.2, 2.14, 7.1, 7.6, 7.13)

DIRECTIONS

Evaluate the student by checking the appropriate box to indicate the degree of competency. The rating for each competency should reflect **employability readiness** rather than the grades given in class.

Rating Scale:

0 No Exposure

1 Introduced – the student has been exposed through non-participatory instruction (e.g. lecture, demonstration, field trip, video)

2 Practiced – the student can perform the task with direct supervision.

3 Entry-Level Competency – the student can perform the task with limited supervision and/or does not perform the task to standard (a typical entry-level performance expectation)

4 Competency – the student consistently performs task to standards with no supervision (on at least two occasions or at instructor's option).

HORTICULTURE SCIENCE AND TECHNOLOGY

SECTION 1

FUNDAMENTALS OF HORTICULTURE (All Students)

0 1 2 3 4

00000

A. Horticulture Careers

- *A.001 Identify the areas of specialization in the horticulture industry.
- *A.002 Evaluate employment opportunities in the horticulture industry.
- *A.003 Describe job requirements for specific horticulture careers.

00000

B. Plant Science Processes

- *B.001 Explain the process of photosynthesis.
- *B.002 Analyze the processes of respiration, water absorption, translocation, and transpiration.
- *B.003 List the requirements for healthy plant growth.
- *B.004 Differentiate among annual, biennial, and perennial plant life spans.
- *B.005 Identify major plant pests and diseases.

00000

C. Plant Science Taxonomy

- *C.001 Demonstrate the use of plant nomenclature (scientific classification).
- *C.002 Identify leaf shapes and types of leaf arrangements.
- *C.003 Use plant identification characteristics.
- *C.004 Identify plant hardiness zones.
- *C.005 Identify floral parts.
- *C.006 Identify taproot and fibrous root systems.
- *C.007 Distinguish between woody and herbaceous plants.

00000

D. Soil Science Concepts

- *D.001 Identify the nature and the properties of soil.
- *D.002 Identify the roles of organic matter.
- *D.003 Collect soil samples for analysis.
- *D.004 Analyze soil samples for available nutrients and pH.
- *D.005 Identify roles of fertilizers and lime.
- *D.006 Identify the functions of major nutrients in plant growth.
- *D.007 Pasteurize soils. Expose only.
- *D.008 Identify and use artificial growth media.

*D.009 Compost organic materials.

00000

E. Plant Propagation: Sexual

- *E.001 Identify seed parts.
- *E.002 Identify and apply seed germination practices.
- *E.003 Transplant seedlings.

00000

F. Plant Propagation: Asexual

- *F.001 Describe and apply methods of asexual plant propagation (layering, grafting, budding, division, and cuttings).

00000

G. Pest Control

- *G.001 Use, handle, store, and dispose of pesticides safely (follow manufacturer's recommendations).
- *G.002 Interpret pesticide information on an agricultural chemical label.
- *G.003 Classify insecticides, fungicides, bactericides, and herbicides.
- *G.004 Identify signs of pesticide poisoning in plants.
- *G.005 Maintain pesticide use records.
- *G.006 Perform safety checks on pesticide application equipment.
- *G.007 Use integrated pest management (IPM) practices.
- *G.008 Identify common weeds, pests, and diseases.
- *G.009 Clean and store pesticide and chemical application equipment.
- *G.010 Recognize symptoms of pesticide poison and apply first aid.
- *G.011 Reduce dangers of insecticide residues on fruits, vegetables, ecosystems, and application equipment.

BUSINESS MANAGEMENT AND RECORD KEEPING

00000

A. Horticulture Enterprises

- *A.001 Prepare a cost estimate of horticultural project.
- *A.002 Develop an enterprise plan.

00000

B. Finance and Record Management

- *B.001 Maintain horticultural business records.
- *B.002 Identify sources of credit.
- *B.003 Reconcile a bank statement.
- *B.004 Prepare and mail bills to collect accounts due.
- *B.005 Prepare bank deposits.
- *B.006 Calculate and analyze statement of financial condition.
- *B.007 Complete a profit and loss statement.
- *B.008 Determine insurance coverage needs.

00000

C. Sources of Horticultural Information and Assistance

- *C.001 Identify sources of horticultural information and assistance.
- *C.002 Maintain a file of current technical information.
- *C.003 Participate in associations and societies related to horticultural enterprises.
- *C.004 Use computer software for records, reports, and horticultural applications.

SALES, MERCHANDISING, AND MARKETING

00000

A. Sales Tasks

- *A.001 Describe to customers the purposes and qualities of merchandise for sale.
- *A.002 Identify customer needs and wants.
- *A.003 Conduct and close a sale.
- *A.004 Make cost estimates for customers.
- *A.005 Complete sales forms.

- *A.006 Use effective interpersonal relationships with customers.
- *A.007 Label and price products.
- *A.008 Use sales catalogs.

00000 **B. Product and Service Advertising and Marketing**

- *B.001 Prepare advertising materials.
- *B.002 Prepare an attractive display of plants.
- *B.003 Plan marketing strategy.
- *B.004 Examine consumer characteristics.

00000 **C. Customer Services**

- *C.001 Provide customers with technical assistance.
- *C.002 Process customer complaints.
- *C.003 Process customer product returns.
- *C.004 Package customer purchases.
- *C.005 Provide recommendations for control of pests.
- *C.006 Describe care and use of plants to customers.
- *C.007 Maintain customer file system.

HORTICULTURE MECHANICS

00000 **A. Horticultural Equipment Operation**

- *A.001 Operate tractor.
- *A.002 Operate shovel and back hoe.
- *A.003 Hitch towed equipment.
- *A.004 Operate powered sprayer equipment.
- *A.005 Operate fertilizer equipment.
- *A.006 Operate a chain saw. (Core for arboriculture and landscape)

00000 **B. Safety Practices**

- *B.001 Apply basic emergency first aid techniques.
- *B.002 Use fire extinguisher.
- *B.003 Administer cardiopulmonary resuscitation (CPR).
- *B.004 Participate in safety training programs.

A school may offer one or more areas of specialization: Greenhouse Operation, Retail Florist, Arborist Services, Nursery Operation, Landscape/Turf Services, and Fruit and Vegetable Production.

SECTION II

GREENHOUSE OPERATION

00000 **A. Plant Identification**

- *A.001 Identify 50 specific greenhouse plants.
- *A.002 Classify plants according to growth habit, shape, and common name.
- *A.003 Describe site preference of plants.

00000 **B. Greenhouse Plant Propagation**

- *B.001 Prepare seed for germination.
- *B.002 Sow seed.
- *B.003 Transplant seedlings and rooted cuttings.
- *B.004 Label planted specimens.
- *B.005 Plant bulbs.
- *B.006 Prepare a rooting bed
- *B.007 Plan planting schedule.

00000

C. Growing Mediums and Seed Beds

- *C.001 Adjust pH level of media.
- *C.002 Select planting media (components).
- *C.003 Mix fertilizer with planting media.
- *C.004 Apply sanitation practices when handling and storing plant media materials.

00000

D. Plant Environment Control

- *D.001 Water plants.
- *D.002 Prune and thin plants.
- *D.003 Fertilize with dry and liquid fertilizers.
- *D.004 Monitor plant growth.
- *D.005 Pinch and disbud flowering plants.
- *D.006 Force potted plants to bloom at seasonal times.
- *D.007 Dispose of diseased plants.
- *D.008 Aerate compacted soils.
- *D.009 Report disease and spray damage.
- *D.010 Regulate growth of plants through chemical means.
- *D.011 Read and interpret information on a fertilizer label.
- *D.012 Collect leaf tissue samples for analysis.
- *D.013 Treat nutrient deficiencies.
- *D.014 Identify chemical injury of plants.

00000

E. Pest Control

- *E.001 Identify pest problems.
- *E.002 Apply chemicals to eliminate weeds, insects, and diseases.
- *E.003 Calibrate pesticide and/or chemical application equipment.
- *E.004 Operate, adjust, and maintain, pesticide and chemical application equipment.
- *E.005 Select a pesticide for a problem situation.
- *E.006 Calculate chemical applications.
- *E.007 Dispose of chemicals and containers according to manufacturer and governmental specifications.
- *E.008 Maintain chemical inventory file, keeping in mind "Right to Know" regulations.
- *E.009 Interpret and use spray compatibility chart.

NURSURY OPERATION

(Includes ornamental and shade tree production, ornamental shrubbery, and perennial plants)

00000

A. Nursery Plant Identification

- *A.001 Identify 50 ornamental tree, shrubbery, and perennial plants.
- *A.002 Classify plants according to growth habit, shape, and common name.
- *A.003 Describe site preference of plants.

00000

B. Nursery Plant Propagation

- *B.001 Prepare seed for germination.
- *B.002 Sow seed.
- *B.003 Transplant seedlings and rooted cuttings.
- *B.004 Label planted specimens.
- *B.005 Plant bulbs.
- *B.006 Prepare a rooting bed.

00000

C. Growing Mediums and Seed Beds

- *C.001 Adjust pH level of media.
- *C.002 Select planting media (components).
- *C.003 Mix fertilizer with planting media.
- *C.004 Apply sanitation practices when handling and storing plant media materials.
- *C.005 Mix media materials.

00000

D. Plant Environment Control

- *D.001 Water nursery stock.
- *D.002 Prune and thin plants.
- *D.003 Fertilize with dry and liquid fertilizers.
- *D.004 Monitor plant growth.
- *D.005 Plant nursery stock.
- *D.006 Provide for winterization of plants.
- *D.007 Care for "over winterizing" of container grown plants.
- *D.008 Demonstrate root pruning techniques.
- *D.009 Apply mulches.
- *D.010 Dispose of diseased plants.
- *D.011 Aerate compacted soils.
- *D.012 Report disease and spray damage.
- *D.013 Regulate growth of plants through chemical means.
- *D.014 Read and interpret information on a fertilizer label.
- *D.015 Collect soil and leaf tissue samples for analysis.
- *D.016 Identify nutrient deficiency symptoms in growing plants.

00000

E. Pest Control

- *E.001 Identify pest problems.
- *E.002 Apply chemicals to eliminate weeds, insects, and diseases.
- *E.003 Calibrate pesticide and/or chemical application equipment.
- *E.004 Operate, adjust, and maintain pesticide and chemical application equipment.
- *E.005 Select a pesticide for a problem situation.
- *E.006 Calculate chemical applications.
- *E.007 Dispose of chemicals and containers according to manufacturer and governmental specifications.
- *E.008 Maintain chemical inventory file, keeping in mind "Right to Know" regulations.
- *E.009 Interpret and use spray compatibility chart.

RETAIL FLORIST

00000

A. Floral Design

- *A.001 Design artificial flower and foliage arrangements.
- *A.002 Design circle arrangements.
- *A.003 Design corsages.
- *A.004 Design dish gardens.
- *A.005 Design dried arrangements.
- *A.006 Design planters and terrariums.
- *A.007 Design oval arrangements.
- *A.008 Design right angle shaped arrangements.
- *A.009 Design symmetrically/asymmetrically balanced triangle arrangements.
- *A.010 Design vertically shaped arrangements.
- *A.011 Dress potted plants.
- *A.012 Make bows.
- *A.013 Spray tint dried and live floral products.
- *A.014 Wire flowers using piercing, hairpin, and hook-wire methods.
- *A.015 Make silk flowers and foliage arrangements.
- *A.016 Design bud vases.
- *A.017 Construct boutonnières.
- *A.018 Identify seasonal arrangements and displays.
- *A.019 Design seasonal arrangements and displays.
- *A.020 Identify design styles.

00000

B. Plant Environmental Control

- *B.001 Water plants and nursery stock.
- *B.002 Remove diseased and infested plants.
- *B.003 Pinch and disbud flowering plants.
- *B.004 Attach care cards to plants.

- *B.005 Receive and care for cut flowers obtained from wholesaler.
- *B.006 Clean storage facility.

00000

C. Pest Control

- *C.001 Identify pest problems.
- *C.002 Apply chemicals to eliminate weeds, insects, and diseases.
- *C.003 Calibrate pesticide and/or chemical application equipment.
- *C.004 Operate, adjust, and maintain pesticide and chemical application equipment.
- *C.005 Select a pesticide for a problem situation.
- *C.006 Calculate chemical applications.
- *C.007 Dispose of chemicals and containers according to manufacturer and governmental specifications.
- *C.008 Maintain chemical inventory file, keeping in mind "Right to Know" regulations.
- *C.009 Interpret and use spray compatibility chart.

LANDSCAPE/TURF SERVICES

00000

A. Landscape Plant Identification

- *A.001 List culture requirements of landscape plants.
- *A.002 Identify species of landscape plants.
- *A.003 Determine grades of landscape plants.
- *A.004 Identify lawn grasses and ground covers.
- *A.005 Select plants.

00000

B. Landscape Area Preparation

- *B.001 Interpret blueprints and plans.
- *B.002 Determine the time to plant various species.
- *B.003 Survey, grade, rake and level the site.
- *B.004 Prepare seed beds for bulbs, seeds, cuttings and shrubs.
- *B.005 Understand and apply surface drainage principles.
- *B.006 Clear brush and unwanted plants.
- *B.007 Collect soil samples.
- *B.008 Apply fertilizers.
- *B.009 Spread and level topsoil.

00000

C. Trees, Shrubs, Ground Cover, and Flowers Planting

- *C.001 Plant "balled-and-burlapped" and container grown stock.
- *C.002 Determine spacing and depth of plantings.
- *C.003 Plant bare root plants.
- *C.004 Select and apply mulching material.
- *C.005 Support woody plants by guying, staking, or cabling.
- *C.006 Plant seeds and bulbs.
- *C.007 Irrigate new plantings.
- *C.008 Plant flowers and shrubs.
- *C.009 Follow landscape plan in installing plants.
- *C.010 Control weeds and soil insects with I'M.

00000

D. Turf and Lawn Establishment and Renovation

- *D.001 Plant grasses by sodding, sprigging, and/or seeding.
- *D.002 Roll newly sodded areas.
- *D.003 Determine seeding and sprigging rates and methods.
- *D.004 Thatch and renovate turf.

00000

E. Tree, Shrub, Ground Cover, and Flower Maintenance

- *E.001 Water ornamental plants.
- *E.002 Trim and prune trees and shrubs.
- *E.003 Cultivate and mulch plants.
- *E.004 Provide winter protection.

- *E.005 Brace and repair trees.
- *E.006 Identify nutrient deficiencies.

00000

F. Landscape Design

- *F.001 Analyze site for the landscape.
- *F.002 Survey the area to be landscaped.
- *F.003 Locate existing utilities lines in landscape area.
- *F.004 Select the plant materials to be used.

00000

G. Pest Control

- *G.001 Identify pest problems.
- *G.002 Apply chemicals to eliminate weeds, insects, and diseases.
- *G.003 Calibrate pesticide and/or chemical application equipment.
- *G.004 Operate, adjust, and maintain pesticide and chemical application equipment.
- *G.005 Select a pesticide for a problem situation.
- *G.006 Calculate chemical applications.
- *G.007 Dispose of chemicals and containers according to manufacturer and governmental specifications.
- *G.008 Maintain chemical inventory file, keeping in mind "Right to Know" regulations.
- *G.009 Interpret and use spray compatibility chart.
- *G.010 Identify common lawn insects.

ARBORIST SERVICES

00000

A. Tree Care and Maintenance

- *A.001 Prune and trim shade trees.
- *A.002 Provide winter protection.
- *A.003 Remove broken and storm damaged limbs.
- *A.004 Remove brush and weeds.
- *A.005 Fell trees.
- *A.006 Remove tree stumps.
- *A.007 Climb trees.
- *A.008 Cable and brace weak trees or limbs.
- *A.009 Fertilize established trees.
- *A.010 Identify trees.

00000

B. Pest Control

- *B.001 Identify pest problems.
- *B.002 Apply chemicals to eliminate weeds, insects, and diseases.
- *B.003 Calibrate pesticide and/or chemical application equipment.
- *B.004 Operate, adjust, and maintain pesticide and chemical application equipment.
- *B.005 Select a pesticide for a problem situation.
- *B.006 Calculate chemical applications.
- *B.007 Dispose of chemicals and containers according to manufacturer and governmental specifications.
- *B.008 Maintain chemical inventory file, keeping in mind "Right to Know" regulations.
- *B.009 Interpret and use spray compatibility chart.

FRUIT AND VEGETABLE PRODUCTION

00000

A. Soil Management

- *A.001 Identify soil and site characteristics.
- *A.002 Relate soil and site characteristics to crops.
- *A.003 Develop a crop rotation plan.
- *A.004 Secure or make a soil map.
- *A.005 Obtain a soil sample for testing.
- *A.006 Interpret soil test results.
- *A.007 Evaluate soil drainage.
- *A.008 Identify erosion potential and control.

*A.009 Plan conservation practices.

00000

B. Soil Preparation for Planting

- *B.001 Select a site for planting.
- *B.002 Prepare a seed bed with a plow, disk, tiller, and/or harrows.
- *B.003 Perform field adjustments to tillage equipment.
- *B.004 Construct open drainage ditch.
- *B.005 Row up (bed) land.
- *B.006 Cut crop residue with a rotary mower.

00000

C. Crop Planting/Transplanting

- *C.001 Identify fruit and vegetable crops.
- *C.002 Select high quality seed and transplant.
- *C.003 Determine method for planting.
- *C.004 Perform field adjustments to planters and/or transplanters.
- *C.005 Plant seed using mechanical planter.

00000

D. Crop Fertilizer

- *D.001 Calibrate fertilization equipment.
- *D.002 Read and interpret information on a fertilizer label.
- *D.003 Apply fertilizer and lime.
- *D.004 Identify major nutrient deficiency symptoms in plants.
- *D.005 Clean and store fertilization equipment.
- *D.006 Collect soil sample for fertility test.